Modeling, Analysis, Prediction and Projection (MAPP) Program
FY2011 Information Sheet

The mission of the MAPP Program is to enhance the Nation's capability to predict variability and changes of the Earth's System. The Program focuses on the coupling, integration and application of Earth System models and analyses across NOAA, among partner agencies, and with the external research community in support of NOAA's role in the emerging NOAA Climate Service. Primary objectives include 1) improving Earth System models, 2) supporting an Earth System Integrated Analysis capability, 3) improving methodologies for global and regional-scale analysis, predictions and projections, and 4) developing integrated assessment and prediction capabilities relevant to decision makers based on climate analyses, predictions and projections. The MAPP Program includes targeted infrastructure support, competitive grants programs to support research, and mechanisms to support transferring research findings into NOAA's operations.

The MAPP Program builds upon the following CPO predecessor programs: CDEP (ARCs, Climate Test Bed, Reanalysis), and the elements of CPPA and CVP programs most closely related to MAPP's objectives; other elements of CPPA and CVP programs are included in the Earth System Science (ESS) Program.

In FY2011, the MAPP program will accept proposals under three major themes: 1) Advances in regional-scale climate predictions and projections, 2) Develop an Integrated Drought Prediction Capability, and 3) Evaluate Recently Developed Reanalysis Projects.

1. **Advances in Regional-Scale Climate Predictions and Projections**
   Providing accurate and reliable regional-scale predictions of climate variability and change will be a crucial element in the provision of NOAA's Climate Services. Significant advances beyond state-of-the-art climate modeling capability are needed to overcome current limitations. In view of recent progress in computer resources, global models that simulate climate at very high-resolution (e.g. 25km and under) are now being evaluated. It is important to prepare to fully exploit such a global high-resolution climate modeling capability. In addition, uncertainties in regional climate change projections based on state-of-the art modeling tools and approaches need to be carefully evaluated. Findings from such research activities will guide the development and provision of best objective regional predictions and projections for impact studies and stake-holder use.

   In response to the Nation's need for regional-scale climate predictions and projections, in FY2011 MAPP Program will support research efforts in the following priority areas.

   1a) Support the development of next-generation global climate models
   The MAPP Program solicits research proposals to support the development of next-generation global climate models involving both higher resolution and improved physical representations. Proposals' objectives and research activities should demonstrate a clear path to achieving a better understanding of how the simulation and prediction of climate variability in global models is affected by i) increases in model resolution and ii) the use of different cutting edge approaches in the representation of key physical processes (e.g.

convection). PIs should propose coordinated research efforts i) considering more than one leading global climate model (national or international) to ensure that findings are model independent and ii) focusing on the models' ability to simulate and hindcast observed aspects of climate variability at global and regional scale in recent decades (e.g. tropical storm activity, MJO, ENSO, etc.) as a benchmark for performance. Projects may leverage on already existing simulations, or may propose new sets of global climate simulations. Proposals should include a detailed plan for computer resources, and data storage, distribution and analysis. For proposals requiring modeling centers' involvement, a letter of support from the modeling center lead should be included. If computational resources are required from NOAA platform at DOE ORNL, a request should be included in the proposal describing the computational resources and data storage required.

1b) Evaluate uncertainties in regional-scale climate predictions and projections

The MAPP Program solicits research investigations that aim at evaluating uncertainties in the long-term prediction and projection of twenty-first century climate over North America. Proposals will develop regional climate predictions and projections and evaluate associated uncertainties based on the modeling tools and approaches in use for the Fifth Assessment Report (AR5) of the IPCC (e.g. global climate model projections, high-resolution time-slice experiments, regional dynamical and statistical downscaling, etc.). In addition to the conventional projections methodology, initialized decadal climate predictions will also be available for the AR5 and may also be considered in the investigations. Proposals should include a rationale for reducing uncertainties in regional projections beyond the state-of-the-art, based on improved physical understanding and the application of new methodologies to analyze and combine outputs from available modeling tools and approaches. Leveraging on the lessons learned from previous coordinated experiments such as North American Regional Climate Change Assessment Program (NARCCAP), ENSEMBLES and coordination with Coupled Model Intercomparison Project Phase 5 (CMIP5) activities are strongly encouraged.

2. Develop an Integrated Drought Prediction Capability

Drought is among the most damaging natural hazards, and drought prediction is of great national interest. Drought monitoring and forecasts are key components of the Early Warning Information System implemented by the National Integrated Drought Information System (NIDIS). MAPP, by means of its predecessor program CPPA, has long been supporting efforts to better monitor and predict national drought with many advances now contributing to the current official national drought products (the "US Drought Monitor" and the "US Seasonal Drought Outlook") and NIDIS.

With this FY2011 funding opportunity, MAPP intends to bring significant new advances to current capability to predict seasonal drought over North America by supporting the development of a next-generation Integrated Drought Prediction System. Proposed system prototypes should incorporate cutting-edge research advances in climate prediction (e.g. high resolution predictions, statistical approaches, predictions from multiple leading modeling platforms, best practices to combine and pre-process the data, etc.), and land-surface and

hydrologic modeling and data assimilation (e.g. use of multiple land and hydrologic models). Proposers should demonstrate a path to improvements beyond the state-of-the-art in drought prediction in one or more of the following areas: 1) the capability to integrate across spatial scales (i.e. national drought products that can scale down to provide useful information to River Forecast Center operations) demonstrating an understanding of the needs of regional users, 2) considerations of interoperable capability to link to multiple data sources, multiple models or model components and efforts and to objectively consolidate various drought-related predictions (such as, soil moisture, hydrology, vegetation cover) from various sources at different spatial scales ; 3) verification of prediction skill based on past performance and evaluation of uncertainties based on model formulation. Proposals should leverage heavily on pre-existing research efforts and state-of-art achievements, and should focus on the coupling and integration of various components, and extensions to overcome current limitations to deliver improved seasonal drought predictions. At the national level, leading integrated hydrologic prediction systems which contribute to NOAA's operations include the NWS Community Hydrologic Prediction System (CHPS) and the NOAA Climate Prediction Center's Experimental National Hydrologic Prediction System. Leveraging on inter-agency efforts such as NASA's Land Information System (LIS) is also encouraged. Investigators are strongly encouraged to leverage on available regional-scale climate hindcasts over North America to avoid replicating efforts.

3. **Evaluate Recently Developed Reanalysis Projects**

NOAA has recently completed two major Reanalysis efforts, the Climate Forecast System Reanalyses (CFS-R) run at NCEP/NWS and the 100-year Historical Reanalysis Project produced at ESRL. A number of other major Reanalyses Projects have also recently been completed (e.g. NASA's MERRA product, ERA-Interim, etc.); an Arctic System Reanalysis has also recently been developed. MAPP solicits proposals to contribute to the general evaluation of recently developed reanalysis projects. Investigations may i) investigate general aspects of the general circulation, and the global water and energy cycles (such as temporal and spatial structure of biases and uncertainties) comparing CFS-R with other Reanalyses products and independent observations; ii) investigate the impacts of non-stationarities in the observational system on the reanalysis products.

Funding Information:

It is anticipated that $3 million will be available for this call. Projects will typically be in the $75,000-$200,000 range for up to three years. Smaller one-year grants ($50,000-$75,000) are envisioned for Priority 3. Proposals exceeding the typical range may be considered for Priority 1(a).

MAPP Contact Information:

Interested applicants for all competitions are highly encouraged to submit a 2-page Letter of Intent (LOI) outlining plans for a full proposal to Zachary Zhao (Zachary.Zhao@noaa.gov) with cc to Jin Huang (Jin.Huang@noaa.gov).

For additional information, investigators should contact Don Anderson (don.anderson@noaa.gov, 301-734-1222), Jin Huang (Jin.Huang@noaa.gov, 301-734-1226), Annarita Mariotti (Annarita.Mariotti@noaa.gov, 301-734-1237) or Chester Ropelewski (Chet.Ropelewski@noaa.gov, 301-734-1210).